

WE CLAIM:

1 1. A sputter-coated glass article comprised of a
2 glass substrate having on a planar surface thereof, from
3 the glass outwardly, a layer system including:

4 a) a layer comprised of Si_3N_4 and stainless steel
5 wherein said stainless steel is in an amount of about 0.5%-
6 15% by weight of said layer;

7 b) a layer of nickel or nichrome;

8 c) a layer of silver;

9 d) a layer of nickel or nichrome; and

10 e) a layer comprised of Si_3N_4 and stainless steel,
11 wherein said stainless steel is in an amount of about 0.5%-
12 15% by weight of said layer, and wherein

13 when said glass substrate has a thickness of
14 about 2mm-6mm, said coated glass substrate has a normal
15 emissivity (E_n) of about 0.06 or less, a hemispherical
16 emissivity (E_h) of about 0.07 or less, a sheet resistance
17 (R_s) of about 5.0 ohms/_{sq.} or less and having a substantially
18 neutral visible reflected color when viewed from the glass
19 side.

1 2. A sputter-coated glass article according to claim
2 1 wherein said coated glass substrate has a visible
3 transmittance of at least about 70%.

1 3. A sputter-coated glass article according to claim
2 wherein said glass article is heat treatable.

1 4. A sputter-coated glass article according to claim
2 wherein said layer system further includes an undercoat
3 layer comprised of TiO_2 , and the layers have about the
4 following thicknesses:

	<u>layer</u>	<u>thickness (Å)</u>
6	undercoat	100-400
7	a	20-120
8	b	7-50
9	c	75-225
10	d	7-30
11	e	50-600

1 5. A sputter-coated glass article according to claim
2 4 wherein said glass substrate has a normal emissivity (E_n)
3 of about 0.05 or less, a hemispherical emissivity (E_h) of
4 about 0.06 or less, a sheet resistance (R_s) of about 5.0
5 ohms/_{sq.} or less.

1 6. A sputter-coated glass article according to claim
2 5 consisting essentially of said undercoat layer and layers
3 (a)-(e) and wherein said stainless steel in said layers (a)
4 and (e) is in an amount of about 6% by wt. of said layer.

1 7. A sputter-coated glass article according to claim
2 6 wherein the layers have about the following thicknesses:

	<u>layer</u>	<u>thickness (Å)</u>
4	undercoat	200-250
5	a	40-60
6	b	7-30
7	c	150-180
8	d	7-15
9	e	400-500

1 8. A sputter-coated article according to claim 7
2 wherein said layers (b) and (d) are comprised of chromium
3 nitride, and said stainless steel is comprised of chromium
4 nitride.

1 9. A sputter-coated article according to claim 8
2 wherein the layers have about the following thicknesses:

	<u>layer</u>	<u>thickness (Å)</u>
4	undercoat	225
5	a	50
6	b	20
7	c	165
8	d	7
9	e	450

10 and wherein the glass substrate having said layer system
11 thereon has the following characteristics:

12 GLASS SIDE

13 $R_G Y$ is about 11.0
14 a_h is about 2.3
15 b_h is about -8.8

16

FILM SIDE

17 R_fY is about 6.0
18 a_h is about 5.4
19 b_h is about -17.5

20 wherein RY is the reflectance and a_h and b_h are the color
21 coordinates as measured in Hunter units, Ill. C, 10°
22 observer, and wherein said layer system is mechanically and
23 chemically durable and has a visible transmittance of about
24 76%.

1 10. A sputter-coated article according to claim 9
2 wherein said layer system is heat treatable.

1 11. A sputter-coated glass article according to claim
2 1 wherein said layer system consists essentially of said
3 layers (a)-(e) and said layers have about the following
4 thicknesses:

5	<u>layer</u>	<u>thickness (Å)</u>
6	a	200-600
7	b	7-50
8	c	115-190
9	d	7-30
10	e	50-600

1 12. A sputter-coated article according to claim 11
2 wherein the layers have about the following thicknesses:

3	<u>layer</u>	<u>thickness (Å)</u>
4	a	400-500
5	b	7-30
6	c	140-170
7	d	7-15
8	e	400-600

1 13. A sputter-coated article according to claim 12
2 wherein said layer system is chemically and mechanically
3 durable.

1 14. A sputter-coated article according to claim 13
2 wherein said layers have about the following thicknesses:

	<u>layer</u>	<u>thickness (Å)</u>
4	a	450
5	b	20
6	c	155
7	d	7
8	e	550

9 and wherein said glass substrate having said layer system
10 thereon has a visible transmittance greater than about 70%.

1 15. A sputter-coated article according to claim 14
2 wherein said glass substrate having said layer system
3 thereon has the following characteristics:

4 GLASS SIDE

5 $R_g Y$ is about 10.2
6 a_h is about 0.4
7 b_h is about -4.7

8 FILM SIDE

1 16. A sputter-coated article according to claim 15
2 wherein said layer system is heat treatable.

1 17. A sputter-coated article according to claim 16
2 wherein said stainless steel in layers (a) and (e) is in an
3 amount of about 6% by weight of said layer.

1 18. A sputter-coated article according to claim 17
2 wherein said layers (b) and (c) are comprised of chromium
3 nitride and said stainless steel is comprised of chromium
4 nitride.

1 19. A sputter-coated article according to claim 1
2 wherein said stainless steel is No. 316 stainless steel.

1 20. A sputter-coated article according to claim 1
2 wherein said glass substrate having said layer system on
3 one of the surfaces thereof has the following
4 characteristics:

GLASS SIDE

$R_g Y$ is about 8 to 18
 a_h is about -3 to +3
 b_h is about 0 to -15

FILM SIDE

10 $R_f Y$ is about 4 to 15
11 a_h is about 0 to +8
12 b_h is about -5 to -20

13 wherein RY is the reflectance and a_h and b_h are the color
14 coordinates as measured in Hunter units, Ill. C, 10°
15 observer.

1 21. A sputter-coated article according to claim 20
2 wherein the glass side and film side characteristics are:

3 GLASS SIDE

4 $R_g Y$ is about 9 to 15
5 a_h is about -1 to +3
6 b_h is about -4 to -10

7 FILM SIDE

8 $R_f Y$ is about 4 to 10
9 a_h is about +3 to +7
10 b_h is about -10 to -20.

1 22. A sputter-coated article according to claim 1
2 wherein said visible transmittance of said coated glass
3 substrate is about 74%-76%.

1 23. An insulating glass unit comprised of at least
2 two substantially parallel, spaced sheets of glass wherein
3 at least one sheet of glass is a sputter-coated sheet of
4 glass according to claim 1.

1 24. An insulating glass unit according to claim 23
2 wherein said two sheets of glass are sealed together at
3 their peripheral edges thereby to define an insulating
4 chamber therebetween, and wherein said layer system is

5 located on a surface of one of said glass sheets within
6 said insulating chamber, and the reflectance and color
7 characteristics when viewed from outside are:

8 R_gY about 14 to 20
9 a_h about -2 to +2
10 b_h about 0 to -10

11 and when viewed from the inside are:

12 R_fY about 11 to 18
13 a_h about 0 to +4
14 b_h is about 0 to -10

15 and the visible transmittance is at least about 61%.

1 25. An insulating glass unit according to claim 24
2 wherein said unit is an insulating glass window, door or
3 wall and the visible transmittance is at least about 63%.

1 26. An insulating glass unit comprised of at least
2 two substantially parallel, spaced sheets of glass sealed
3 together at their peripheral edges thereby to define an
4 insulating chamber therebetween, wherein at least one of
5 said glass sheets is a sputter-coated sheet of glass
6 according to claim 4 wherein said layer system is located
7 within said insulating chamber.

1 27. An insulating glass unit comprised of at least
2 two substantially parallel, spaced sheets of glass and
3 sealed together at their peripheral edges thereby to define
4 an insulating chamber therebetween, wherein at least one of
5 said glass sheets is a sputter-coated sheet of glass

6 according to claim 8 wherein said layer system is located
7 within said insulating chamber.

1 28. An insulating glass unit comprised of at least
2 two substantially parallel, spaced sheets of glass heat
3 sealed together at their peripheral edges and defining a
4 substantially air-free insulating chamber therebetween,
5 wherein at least one of said glass sheets is a sputter-
6 coated sheet of glass according to claim 10, wherein said
7 layer system is located within said insulating chamber.

1 29. An insulating glass unit comprised of at least
2 two substantially parallel, spaced sheets of glass sealed
3 together at their peripheral edges thereby to define an
4 insulating chamber therebetween, wherein at least one of
5 said glass sheets is a sputter-coated sheet of glass
6 according to claim 11 wherein said layer system is located
7 within said insulating chamber.

1 30. An insulating glass unit comprised of at least
2 two substantially parallel, spaced sheets of glass and
3 sealed together at their peripheral edges thereby to define
4 an insulating chamber therebetween, wherein at least one of
5 said glass sheets is a sputter-coated sheet of glass
6 according to claim 13 wherein said layer system is located
7 within said insulating chamber.

1 31. An insulating glass unit comprised of at least
2 two substantially parallel, spaced sheets of glass heat
3 sealed together at their peripheral edges and defining a
4 substantially air-free insulating chamber therebetween,
5 wherein at least one of said glass sheets is a sputter-
6 coated sheet of glass according to claim 18, wherein said
7 layer system is located within said insulating chamber.

1 32. In a method of making an insulating glass unit
2 comprised of at least two sheets of glass sealed at their
3 peripheral edges to each other thereby to define at least
4 one insulating chamber therebetween, said method including
5 the steps of spacing said glass sheets apart, said sheets
6 at an elevated temperature, and sealing the peripheral
7 edges of said sheets to each other at or above said
8 elevated temperature, the improvement comprising using as
9 at least one of said glass sheets, said sputter-coated
10 glass article of claim 3, so located that said layer system
11 thereon is within said insulating chamber.

1 33. In the method of claim 32 wherein at least one of
2 said glass sheets is the sputter-coated glass article
3 according to claim 10.

1 34. In the method of claim 32 wherein at least one of
2 said glass sheets is the sputter-coated glass article
3 according to claim 16.